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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

GOFF II, JOHN L

ART UNIT	PAPER NUMBER
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1733

DATE MAILED: 02/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/781,730

Applicant(s)

FARQUHAR ET AL.

Examiner

John L. Goff

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-25,27,29-33,35-37,39-43 and 45-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-25,27,29-33,35-37,39-43 and 45-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 26 November 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5. 6) ☐ Other: _____

DETAILED ACTION

1. This action is in response to Amendment B filed on 11/26/02. All previous objections to the drawings have been overcome. All previous rejections under 35 U.S.C. 112 have been overcome.

Information Disclosure Statement

2. It is noted the references submitted in IDS paper no. 5 were previously considered in IDS paper no. 3.

Claim Objections

3. Claim 50 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 23 requires the limitation disclosed by claim 50, i.e. both claims require the conductor and the remaining layer of resin to be disposed on opposite sides of the resin-impregnated fluoropolymer matrix following the laminating step (See lines 8-10 of claim 23).

Claim Rejections - 35 USC § 112

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
5. Claims 23-25, 27, 29-33, 35-37, 39-43, and 45-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
6. In claim 23, the phrase “the fluoropolymer matrix is interfaced between the conductor and the remaining layer of resin following said laminating” is unclear and confusing. It is uncertain what is meant by the word “interfaced”. It appears from applicant’s arguments (See page 9, lines 1-7 of paper no. 6) that “interfaced” means the conductor and the remaining layer of resin are disposed on opposite sides of the resin-impregnated fluoropolymer matrix following the laminating step. This is the meaning given to “interfaced” by the examiner. This issue should be clarified and reworded as appropriate.
7. In claim 27, the phrase “a portion of the thermosetting resin is coated onto the conductor following the laminating step” is unclear and confusing. It appears this means that thermosetting resin is present (coated) on the conductor through laminating the adhesive coated dielectric material with the conductor. This is the meaning considered by the examiner. This issue should be clarified and reworded as appropriate.
8. Claim 30 (dependent from claim 23) requires the thermosetting resin to be provided in a sheet that is positioned between the fluoropolymer matrix and the conductor. Claim 23 (the independent claim) was amended to require the thermosetting resin to be coated on the fluoropolymer matrix. Is the sheet of thermosetting resin in addition to the thermosetting resin

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that is coated on the fluoropolymer matrix? This issue should be clarified and reworded as appropriate.

9. The term "about" in claim 48 is a relative term which renders the claim indefinite. The term "about" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear as to the tolerance "about" gives to the diameter. It is suggested to delete "about" from the claim.

Claim Rejections - 35 USC § 102

10. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

11. Claims 23, 25, 27, 29, 32, 35, 36, 40-43, 45, and 50 are rejected under 35 U.S.C. 102(b) as being anticipated by Johnson (U.S. Patent 4,747,897).

Johnson is directed to a method of bonding a dielectric material comprising polytetrafluoroethylene (PTFE) to a conductor such as a copper foil by impregnating the dielectric material with a thermosetting resin. Johnson teaches a dielectric material comprising a fluorocarbon such as PTFE and filler material such as ceramic, glass, metal, carbon, etc. (Column 3, lines 5-16). Johnson teaches a liquid thermosetting resin such as epoxy, polyimide, polyamide, etc. (Column 3, lines 3-5). Johnson teaches coating the dielectric material with the thermosetting resin (Column 6, lines 29-31). The resin fills the interstices within the dielectric material and forms an even coating of resin on the materials surface (Column 7, lines 37-41). The coated dielectric material is heated to affect a B-stage cure (Column 4, lines 49-55 and

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Column 6, lines 32-34), and a resin impregnated dielectric sheet is formed. The sheet is then bonded between one or two sheets of copper foil (Column 4, lines 59-63 and Column 6, lines 47-53). The bonding occurs through the application of heat (175 °C) and pressure (100-800 PSI) (Column 7, lines 53-58 and Column 8, lines 7-10). The laminate can be fabricated into a single or double-sided printed circuit board (Column 4, lines 66-68). It is noted a layer of resin is present on each surface of the dielectric material (bonded or not) after lamination (Column 8, lines 1-4). It is further noted Johnson does not specifically recite a solvent included in the thermosetting resin. However, after coating the dielectric material with thermosetting resin Johnson performs a B-stage cure, thus the resin would inherently include a solvent.

Claim Rejections - 35 USC § 103

12. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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14. Claims 24, 33, and 46-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson as applied above in paragraph 11, and further in view of the admitted prior art (Specification pages 1-3 and page 8, lines 10-13).

Regarding claims 24 and 46-48, Johnson teaches all of the limitations in claims 24 and 46-48 as applied above except for a teaching on the specific properties of the dielectric material such as the PTFE is nonfibrillated and the particles are evenly distributed, spherical in shape, and have a diameter of less than 10 microns. However, it is noted Johnson teaches the dielectric material includes PTFE and filler particles. Dielectric material comprising PTFE and filler particles having the above properties is known in the art as shown by the admitted prior art. The admitted prior art is directed to bonding a dielectric material (PTFE matrix) to a conductive layer to form a laminated electrical substrate. The admitted prior art teaches the dielectric material comprises nonfibrillated PTFE and filler particles that are evenly distributed, spherical in shape, and have a diameter of less than 10 microns (Specification pages 1-3 and page 8, lines 10-13). Absent any unexpected results, one of ordinary skill in the art at the time the invention was made reading Johnson in view of the admitted prior art would have readily appreciated using as the dielectric material taught by Johnson the dielectric material (i.e. a dielectric material comprising nonfibrillated PTFE and filler particles that are evenly distributed, spherical in shape, and have a diameter of less than 10 microns) suggested by the admitted prior art.

Regarding claim 33, Johnson teaches all of the limitations in claim 33 except for a teaching on forming a chip carrier. As noted in the admitted prior art (Specification pages 1-3) it is known to form chip carriers using a PTFE matrix bonded to a conductive material. One of ordinary skill in the art at the time the invention was made reading Johnson in view of the

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admitted prior art would have readily appreciated using the method suggest by Johnson to form a chip carrier as suggest by the admitted prior art as only the expected results would be achieved.

15. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson as applied above in paragraph 11, and further in view of Hanson (U.S. Patent 4,670,089).

Johnson teaches all of the limitations in claim 30 as applied above except for a teaching on providing the resin as a sheet. However, it is known in the art to apply the resin as a sheet or as a coating as shown by Hanson. Hanson is directed to a method of bonding a PTFE matrix to a metal substrate using a thermosetting adhesive layer. Hanson teaches a fluorocarbon film comprising PTFE and filler materials such as polyimide, glass, bronze, carbon, etc. (Column 1, lines 27-29 and Column 3, lines 3-6). Hanson teaches that it was known to bond the film to a metal substrate using thermosetting adhesive wherein the adhesive is coated on the film by a brush (Column 1, lines 57-61) or the adhesive is in sheet form and placed between the film and metal prior to bonding by heat (at 190 °C) and pressure (Column 2, lines 3-7 and 30-55 and Column 3, lines 60 and Column 4, lines 33-35). It would have been obvious to one of ordinary skill in the art at the time the invention was made reading Johnson in view of Hanson to modify the bonding method taught by Johnson to incorporate the resin sheet suggested by Hanson as only the expected results would be achieved.

16. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson as applied above in paragraph 11, and further in view of Ueno et al. (U.S. Patent 4,765,860) and Kusano et al. (U.S. Patent 5,425,832).

Johnson teaches all of the limitations in claim 37 as applied above except for a teaching on subjecting the PTFE matrix to a plasma process prior to coating. It is well known in the art

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when bonding a PTFE matrix to a conductive material to first subject the PTFE matrix to a plasma process to provide the PTFE matrix with a hydrophilic surface thereby enhancing adhesion between the PTFE matrix and the conductor as shown for example by Ueno et al. and Kusano et al. One of ordinary skill in the art at the time the invention was made reading Johnson in view of Ueno et al. and Kusano et al. would have readily appreciated modifying the method taught by Johnson to incorporate the well known plasma discharge technique shown for example by Ueno et al. and Kusano et al. to provide the PTFE matrix with a hydrophilic surface thus enhancing the adhesion between the PTFE matrix and the conductor.

Ueno et al. are directed to a method for bonding a plastic base to a metal foil using a plastic resin to form a printed circuit board wherein the surface of the base is subjected to a plasma process to enhance the bonding strength between the base and the foil (Column 2, lines 28-35 and 40-45). Ueno et al. teach a plastic base made of polyester, polyimide, or PTFE (Column 3, lines 14-18). The base is subjected to a plasma discharge (Column 3, lines 23-28 and 33-37). The base is bonded to a metal foil, such as a copper foil, using a thermosetting adhesive (Column 5, lines 4-22), and the bonding occurs under pressure and at room temperature or an elevated temperature (Column 5, lines 23-31). Kusano et al. are directed to bonding a fluoropolymer sheet to a substrate using an adhesive wherein the sheet is modified by plasma discharge treatment to provide a hydrophilic surface for improving adhesion between the sheet and substrate (Column 1, lines 30-33 and 42-44 and Column 2, lines 10-17). Kusano et al. teach a fluoropolymer sheet comprising PTFE (Column 3, lines 48-50). Kusano et al. teach subjecting the sheet to a plasma discharge to form a hydrophilic surface (Column 6, lines 12-17). Kusano et al. teach bonding the PTFE sheet to a copper foil using a thermosetting (epoxy) adhesive by well

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known means such as heating, pressing, and heat pressing (Column 6, lines 18-29 and 66-68 and Column 7, lines 1-3).

17. Claims 31, 39, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson as applied above in paragraph 11, and further in view of Kodokian (U.S. Patent 5,762,741).

Johnson teaches all of the limitations in claims 31 and 39 as applied above except for a teaching on the thermosetting resin including a contrasting dye and 30-75 percent solids.

Regarding claim 31, it is known in the art to use a thermosetting resin with filler material to bond a PTFE matrix to a conductor as shown for example by Kodokian. One of ordinary skill in the art at the time the invention was made reading Johnson in view of Kodokian would have readily understood using a thermosetting resin in the method taught by Johnson that includes filler materials which would have included dyes as suggested by Kodokian as only the expected results would be achieved.

Kodokian is directed to a method for bonding polymeric articles. Kodokian teaches heat and pressure bonding a polymer matrix, such as PTFE and filler material, to a composite layer comprising a conductive material, such as copper, using a thermosetting adhesive that comprises a thermoset and filler material (Column 3, lines 7-8, 11-13, 28-42, 56-58, and 63-67 and Column 7, lines 56-67 and Column 8, lines 1, 4-8, 19-23, 25-28, 66-67 and Column 9, 19-20).

Regarding claim 39, as noted above Johnson teaches a liquid thermosetting resin. Johnson is silent as to the percent solids in the resin. However, one of ordinary skill in the art at the time the invention was made would have readily understood that when using a liquid thermosetting resin as taught by Johnson the resin would have included less than 100% solids.

Regarding claim 49, as to the solids (inorganic particles) impregnating the fluoropolymer matrix it is noted the dielectric material (fluoropolymer matrix) taught by Johnson is the same as that taught by applicant (a dielectric material comprising a fluorocarbon and filler material/particles). Furthermore, the solids suggested by Kodokian are substantially the same as that taught by applicant (organic particles). Therefore, the thermosetting resin with solids taught by Johnson as modified by Kodokian would impregnate the dielectric material in the same way as that taught by applicant, i.e. the solids would not impregnate the dielectric material.

Response to Arguments

18. Applicant's arguments with respect to claims 23-25, 27, 29-33, 35-37, 39-43, and 45-50 have been considered but are moot in view of the new ground(s) of rejection. Applicant argues Johnson does not teach a layer of resin that does not impregnate the dielectric material (fluoropolymer matrix). It is noted Johnson teaches the resin fills the interstices within the dielectric material and forms an even coating of resin on the materials surface (Column 7, lines 37-41). Applicant further argues Johnson does not teach a remaining layer of resin. It is noted Johnson teaches a layer of resin is present on each surface of the dielectric material (bonded or not) after lamination (Column 8, lines 1-4). It is further noted the rejections applied using Ueno et al. are withdrawn in view of applicant's amendment to claim 23 requiring "the fluoropolymer matrix is interfaced between the conductor and the remaining layer of resin following said laminating".

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Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John L. Goff** whose telephone number is **703-305-7481**. The examiner can normally be reached on M-Th (8 - 5) and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Ball can be reached on 703-308-2058. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

John L. Goff

John L. Goff
January 31, 2003

Michael W. Ball
Michael W. Ball
Supervisory Patent Examiner
Technology Center 1700